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WORSTED YARN MANUFACTURE

SYNOPSIS OF FILM (PART I)

1. From Raw Wool to Finished Product.
2. Bags of Australian Wool, as it comes from the Sheep.
3. Grading and Sorting the Wool for Length and Quality of Fibre.
4. Wool Bins. Each Grade of Wool is kept in a Separate Bin.
5. Wool Scouring Machine. Mechanical Rakes Keep the Wool in Motion.
6. The Wool is Sprayed by a Stream of Clear Water, Passing through the Squeeze Rolls.
7. The Wool Next Enters the Drying Machine Where all Moisture is Removed.
8. This Machine Weighs the Wool and Drops it upon a Carrier Apron.
9. The Card Rolls Containing Thousands of Teeth Straighten the Wool Fibre.
10. The Wool Leaves the Cards as "Roving."
11. The Wool is "Combed" for Further Straightening of the Fibres, and to Remove Short Fibres.
12. Many Strands from the "Comb" are Combined in the "Gill Box" and Reduced to a Single Thin Drawing.
13. Gill Box Shows the Action of the Fallers. The Balls of Wool are the Finished Product of the Gill Boxes.
14. Cone Drawing. The Product of the Gill Box is Further Reduced in Size.

15. Cap Spinning. The yarn is Again Reduced, and Twisted to a Firm, Hard Thread.
16. The Threads are Wound on Large Spools Each Containing Many Hundred Yards of Yarn.
17. From the Spools the Parallel Threads Pass Over a Roll and are examined for Imperfections.

Manufacture of Woolens (Part II)

18. Picker Room. The Fibres are Separated and Burrs and Straws removed.
19. The Wool is Blown from the Picker for the Cards.
20. The Wool is Oiled to Replace the Natural Oil Removed in the Scouring Process.
21. This Machine Lays the Roving on the Wool Card.
22. A "Mule." The Product of the Wool Cards is Spun on the Mule. These Yarns are Softer than Those Used for Worsteds.
23. Threads of Wool Used for the "Warp." The Threads are Run Lengthways of the Cloth.
24. Sizing. The Yarn Passes over Rolls through a Tank Containing Thin Glue, to Properly Lay the Fibre.
25. Warp Yarns are Drawn through Slots in Long Wires Called Heddles. When Placed in a Loom, These Heddles rise and fall allowing the Shuttle to Pass through the Opening.
26. Weaving. Each Operator Tends One Loom.
27. The Loom Showing how the Shuttle Carries the "Filling" Threads through the Warp.
28. Burling. The Operator Removes the Lumps and Knots.
29. Mending. Any Defects in the Cloth are Repaired by Hand Sewing.
30. The Woven Cloth is now Thoroughly Washed.

31. Dyeing "in the Piece." Other Cloth is Made of Yarn "Dyed in the Wool."
32. Fulling. Shrinking the Cloth to Make it More Firm and Compact.
33. "Napping" with Teasels, a Kind of Thistle Used to Raise the Surface of Woolens. The Cloth Passes over a Cylinder Containing Teasels.
34. Shearing. After the Cloth is Teaseled it is Sheared. The Nap is Evenly Cut by Revolving Blades.
35. Pressing. The Finished Cloth Passes over the Heated Rolls which Remove all Wrinkles.
36. Folding. The Cloth is Wound into a Bolt on a Thin Board and is then Ready for the Market.

WOOLEN MANUFACTURE

THE manufacture of woolen goods involves the application of a knowledge of many subjects, including mechanics, chemistry and design. It requires more processes and more care than does the manufacture of any other textile.

Wool is a fibre obtained from the fleeces of various animals living in many regions of the world. Sheep of many breeds, goats, llamas, camels, and vicunas furnish us with the different kinds of wool or hair which are used for the many kinds of woolens known to the trade. The wool of sheep is the most important of animal fibres and its manufacture into cloth plays an important part in the world's industries.

There are two general kinds of woolen cloth known as worsteds and woolens. Worsteds are made of long, finely drawn and closely twisted fibres of high lustre while woolens are usually made from short, loosely twisted fibres. The first division includes blankets, broadcloths, kersey and flannels; the second, serges, mohairs, suitings, and covert cloth. Cloths of other weaves, made of wool of either long or short fibre, are known by special trade names.

After wool arrives in the mill, the bales are opened and the contents are sorted. This consists in the separation of the parts of the fleeces according to length, softness and fineness of fibre. The fleece of a single sheep may be divided into six or eight or more grades. Since many mills which sort their own wools use only certain grades, the others are sold again to be used for other purposes.

Modern machinery has greatly lessened the dangers to which wool sorters were formerly exposed. Suction fans carry off the dust and with it the germs of many diseases which cling to the fibres. Some wools which are filled with burrs, straw and dirt are dusted in a machine which opens up the strands while a mechanical fan blows out all the foreign matter.

The wool is still covered with a greasy substance, called the "yolk," which exudes from the skin of the sheep and makes it waterproof. The process of "scouring," removes this by washing the wool in various baths containing potash, soda, or some other chemical. The final tubs or tanks contain only clear water in which the wool is rinsed to remove any trace of chemicals. A hundred pounds of "wool in the grease" may be reduced to less than fifty pounds in the process of scouring.

Some cloths are made of wool which is dyed immediately after the scouring process. This is known as "dyeing in the wool" and permits the dye to penetrate every fibre. Others are "dyed in the piece" after the cloth is woven.

After it is scoured and dyed the wool is put into revolving driers which throw off the moisture through screens. It is still in rather a damp condition and for further drying it is placed on screens through which hot air is blown by a fan or is passed over steam or hot air pipes on a revolving drum.

In many mills the wool is then picked and blended in order to combine various grades or colors or to add cheaper materials such as shoddy made of old cloth, cotton, or other fibres to lessen the cost of the finished cloth.

The wool must now be oiled before it can pass through the machines in which it is made into yarn. This may be done by hand or by an automatic sprayer. The oils used are olive oil, neatsfoot oil and oil made from tallow.

From this point the processes for making worsteds and woolens are different. For worsteds the process next in order is called "carding." This is done by several successive cylinders containing thousands of teeth, by means of which the wool is thoroughly loosened and the fibres laid in parallel strands, called "slivers." The number of carders varies according to the kind of cloth to be made and the quality of the wool used. The laying of the fibres in parallel strands is called "gilling." After the soft "slivers" of wool come from the "gilling" they are "combed." In this process the mechanical combs act as do the brush and comb on the human hair. They leave the fibres in straight, parallel lines and remove any broken fibres or foreign matter. Four slivers are united to form a ball and eighteen balls are fed to the comb at one time. The "slivers" are thus united to form the "top" and fall into a tall can. The finished top resembles a large, loosely wound ball of thick soft ribbon wool.

After combing, and sometimes before, the wool is "back washed" to remove any oil which may have fallen upon it from the machines. Usually four large bowls or tubs are used for this purpose. In the first the wool is washed and it is rinsed in clean water in the others, passing through wringers from one bowl to the next. A series of hot cylinders over which the wool passes, or a mechanical fan, thoroughly dries it before it is drawn into yarn.

The "tops" of wool now pass through various processes, as illustrated in the film, to reduce the "sliver" or roll of soft wool to smaller size, and at the same time to give to the diminishing yarn a slight twist if the finished product is for woolen goods or a tight twist if it is for worsteds. This twisting prevents the woolen yarn from pulling apart as it is reduced in size, and greatly strengthens it. Various machines are used in this process as the film indicates and explains. The rapidly revolving caps on the upright

spinning frame make a tightly twisted and very fine yarn used in worsteds, while the "mule" with its rather slow forward and back motion carries the sliver from the container through rollers, imparting only a slight twist and making the larger, softer yarn used in woolens. In "ring" spinning the process gives the same result as in the upright frame except that the yarn is passed through a ring, where it is diminished in size and twisted and wound on the bobbin by means of a guide wire called a traveler.

The sizes of these yarns depend upon the number of yards required to make a skein or hank of one pound. The cross or filling yarns are usually more tightly twisted than the warp yarns which run lengthwise in the cloth. The large spools, containing the warp yarns, are placed on a creel, as shown on the film, and from these the yarns are drawn off over a beam. The threads of the warp number many thousands. These are inspected as they pass from the spools to the warp beam and any imperfections are remedied. Usually the warp yarns are "sized;" that is, they are run through a solution consisting of a thin glue made from potato starch, cornstarch, moss, or mucilage. The long tank into which the threads pass from the warp beam is called a "slasher." Rollers press the sizing into the yarns and expel any extra glue. Heated rolls dry the sized yarns.

Many cloths are made of two-ply or four-ply yarns. These are obtained by drawing single yarns and twisting together the number of strands necessary for yarn of the required size.

The yarn is now ready for the process of weaving, which consists of the interlacing of threads running at right angles. The lengthwise threads have already been prepared in the warp and the intersecting threads are called the woof, the weft, or the filling. The inserting of these cross threads is done in the same way on all power looms

as it was formerly done in hand weaving. A frame called the "harness" lifts the alternate threads of the warp and lowers the remaining threads. This leaves an opening extending across the warp through which a shuttle containing the filling threads is carried rapidly back and forth. These processes can be best seen in the operation of a hand loom. Machine operation differs in no essential from hand weaving except in speed. Automatic mechanical devices take the place of human hands and steam or electricity furnishes the motive power.

Both worsteds and woolens may be "fulled;" that is, washed and shrunken to thicken the cloth and give it a firmer body. This effect is produced by the application of moisture, heat, and pressure to the woven cloth. The cloth is sewed together at the ends to form an endless belt and then passes into warm, soapy water over pressure rolls which soften the fibres and cause them to lock more firmly together.

If the yarns of which the cloth is made have not been dyed in the wool or in the skein, the woven cloth is dyed in a solid color practically as in the process previously described.

The heavy "nap," or rough surface, produced by "fulling" is further roughened by teasles consisting of vegetable thistles in a narrow box over which the cloth is rolled, or by a vacuum process which produces the same effect as a vacuum cleaner does on a carpet. The raised fibres are then cut to an even length.

Different cloths require different treatments in finishing. Some are boiled or steamed, while others are simply brushed or pressed. A combination of finishing processes may be applied to a single piece of cloth. These are all done mechanically. Steaming is the process here illustrated. Although the wool receives careful inspection in

every process of its manufacture, the closest examination is made before the goods are packed for shipment. Every yard is carefully inspected and marked and imperfect pieces are removed.

QUESTIONS, TOPICS, SUGGESTIONS

1. What states lead in the production of wool? Why?
2. From what foreign countries do we import wool?
3. What animal fleeces are used for woolen manufacture?
4. How do prices of cotton and woolen cloths compare?
5. What states lead in the manufacture of woolen cloth? Why?
6. What city is the leading wool center? Why?
7. Describe the machines and their operation as shown in the film.
8. How may cloth be tested to determine whether it is all wool?
9. Bring to the class different kinds of woolen cloths and tell why they are called by special names.
10. Compare the value of the cotton industry with that of the woolen industry in respect to both raw material and manufactured product.

REFERENCES

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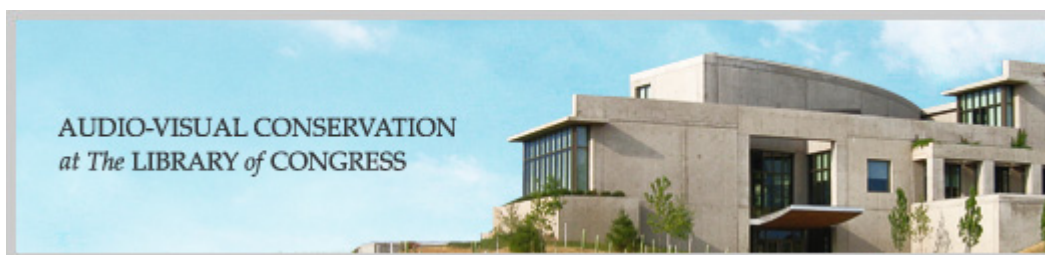
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